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| APPLICATION NO. | FILING DATE | FIRST NAMED INVENTOR | ATTORNEY DOCKET NO. |
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| 09/599,141 | 06/22/00 | YU B | 39153/256 (F |

MM91/0906

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| EXAMINER | |
|---|---|
| ROMAN, A | |
| **ART UNIT** | **PAPER NUMBER** |
| 2812 | |

**DATE MAILED:** 09/06/01

**Please find below and/or attached an Office communication concerning this application or proceeding.**

**Commissioner of Patents and Trademarks**

| Office Action Summary | Application No. 09/599,141 | Applicant(s) YU, BIN | |
|---|---|---|---|
| | Examiner Angel Roman | Art Unit 2812 | |

*-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --*

**Period for Reply**

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If the period for reply specified above is less than thirty (30) days, a reply within the statutory minimum of thirty (30) days will be considered timely.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133).
- Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

**Status**

1)☐ Responsive to communication(s) filed on _____ .

2a)☐ This action is **FINAL**. 2b)☒ This action is non-final.

3)☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

**Disposition of Claims**

4)☒ Claim(s) *1-26* is/are pending in the application.

4a) Of the above claim(s) *25 and 26* is/are withdrawn from consideration.

5)☐ Claim(s) _____ is/are allowed.

6)☒ Claim(s) *1-24* is/are rejected.

7)☐ Claim(s) _____ is/are objected to.

8)☐ Claim(s) _____ are subject to restriction and/or election requirement.

**Application Papers**

9)☒ The specification is objected to by the Examiner.

10)☐ The drawing(s) filed on _____ is/are: a)☐ accepted or b)☐ objected to by the Examiner.

Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).

11)☐ The proposed drawing correction filed on _____ is: a)☐ approved b)☐ disapproved by the Examiner.

If approved, corrected drawings are required in reply to this Office action.

12)☐ The oath or declaration is objected to by the Examiner.

**Priority under 35 U.S.C. §§ 119 and 120**

13)☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).

a)☐ All b)☐ Some * c)☐ None of:

1.☐ Certified copies of the priority documents have been received.

2.☐ Certified copies of the priority documents have been received in Application No. _____ .

3.☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

14)☐ Acknowledgment is made of a claim for domestic priority under 35 U.S.C. § 119(e) (to a provisional application).

a) ☐ The translation of the foreign language provisional application has been received.

15)☐ Acknowledgment is made of a claim for domestic priority under 35 U.S.C. §§ 120 and/or 121.

**Attachment(s)**

1) ☒ Notice of References Cited (PTO-892)
2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
3) ☒ Information Disclosure Statement(s) (PTO-1449) Paper No(s) 2 .
4) ☐ Interview Summary (PTO-413) Paper No(s). _____ .
5) ☐ Notice of Informal Patent Application (PTO-152)
6) ☐ Other: .

## DETAILED ACTION

### *Election/Restrictions*

1. Restriction to one of the following inventions is required under 35 U.S.C. 121:

   I. Claims 1-24, drawn to a method of manufacturing a semiconductor device, classified in class 438, subclass 301.

   II. Claims 25 and 26, drawn to a semiconductor device, classified in class 257, subclass 192.

The inventions are distinct, each from the other because of the following reasons:

2. Inventions I and II are related as process of making and product made. The inventions are distinct if either or both of the following can be shown: (1) that the process as claimed can be used to make other and materially different product or (2) that the product as claimed can be made by another and materially different process (MPEP § 806.05(f)). In the instant case instead of providing an amorphous semiconductor material above a bulk substrate and annealing the amorphous semiconductor material to form a single crystalline semiconductor layer, a crystalline semiconductor layer can be provided on a bulk substrate.

3. Because these inventions are distinct for the reasons given above and have acquired a separate status in the art as shown by their different classification, restriction for examination purposes as indicated is proper.

4. During a telephone conversation with Joseph N. Ziebert on 8/22/01 a provisional election was made with traverse to prosecute the invention of group I, claims 1-24.

**5.** Affirmation of this election must be made by applicant in replying to this Office action. Claims 25 and 26 are withdrawn from further consideration by the examiner, 37 CFR 1.142(b), as being drawn to a non-elected invention.

## *Specification*

6. The disclosure is objected to because of the following informalities: On page 1 line 6 the serial number of the cited U.S. related application is missing.

Appropriate correction is required.

## *Claim Rejections - 35 USC § 102*

7. The following is a quotation of the appropriate paragraphs of 35 U.S.C. 102 that form the basis for the rejections under this section made in this Office action:

> A person shall be entitled to a patent unless –
>
> (e) the invention was described in a patent granted on an application for patent by another filed in the United States before the invention thereof by the applicant for patent, or on an international application by another who has fulfilled the requirements of paragraphs (1), (2), and (4) of section 371(c) of this title before the invention thereof by the applicant for patent.

8. Claims 1-6, 8, 12-16, 18, and 19 are rejected under 35 U.S.C. 102(e) as being anticipated by Hamada U.S. Patent 6,232,622 B1.

Hamada discloses a method of manufacturing an integrated circuit including a transistor with a silicon germanium channel region, the method comprising steps of; depositing an amorphous silicon germanium material above a top surface of a semiconductor substrate; annealing the amorphous silicon germanium material to form a single crystalline semiconductor layer (see column 12, lines 14-59); depositing an amorphous silicon material above the silicon germanium material; annealing the amorphous silicon material to form a single crystalline layer (see column 8, lines 3-45); the annealing temperature for the first and second annealing steps is at or above 1100°C and below 1400°C (see column 4, lines 5-19); and providing a source region and a drain region for the transistor, the source region and the drain region being deeper than a combined thickness of the silicon germanium material and the silicon material and a channel region between the source region and the drain region includes a thin semiconductor germanium region (see figure 8). After forming the amorphous silicon material and before providing a source and drain region a gate structure is provided (see figure 1I), this will inherently form source and drain extensions. Hamada also discloses an annealing step taking place at a temperature sufficient to melt the amorphous semiconductor layer and is below the melting temperature of the substrate (see column 4, lines 5-19). The annealing steps are performed by an excimer laser using a wavelength of 308 nanometers (see column 6, lines 53-65). An oxide layer 6 is provided after the second annealing step.

***Claim Rejections - 35 USC § 103***

9. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

> (a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negatived by the manner in which the invention was made.

10. Claims 7, 9-11, 17, and 20-24 are rejected under 35 U.S.C. 103(a) as being unpatentable over Hamada U.S. Patent 6,232,622 B1 in view of Candelaria U.S. Patent 5,683,934.

Hamada is applied as above but lacks anticipation on disclosing a semiconductor substrate including single crystalline silicon; disclosing a thickness of 100-150 angstroms for the silicon material; and disclosing a thickness of 200-500 angstroms for the silicon germanium material.

Candelaria discloses a method for making an enhanced mobility semiconductor device comprising a channel layer 12 with a thickness of 200-500 angstroms and an epitaxial layer 13 with a thickness of 100-150 angstroms (see column 3, lines 50-57). In view of this disclosure it would have been obvious to a person having ordinary skills in the art at the time the invention was made to disclose a thickness of 100-150 angstroms for a silicon material, and to disclose a thickness of 200-500 angstroms for a silicon

germanium material as disclose in Candelaria in the primary reference of Hamada because these are conventional thickness values use to fabricate channel regions. Furthermore the thickness values are only considered to be the "optimum" thickness values of the values disclose by the Prior Art that a person having ordinary skill in the art would have been able to determine using routine experimentation based, among other things, on the desired accuracy, manufacturing costs, etc. (see In re Boesch, 205 USPQ 215 (CCPA 1980)).

***Conclusion***

11. The prior art made of record and not relied upon is considered pertinent to applicant's disclosure. Maegawa et al. discloses a method of forming a polycrystalline thin film by using a two-step excimer laser annealing. Wang et al., Solomon et al., and Awano are related to germanium channel silicon transistors and method of their fabrication.

12. Any inquiry concerning this communication or earlier communications from the examiner should be directed to Angel Roman whose telephone number is (703) 306-0207. The examiner can normally be reached on Monday to Friday from 8:30 to 5:00.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, John Niebling can be reached on (703) 308-3325. The fax phone numbers for the organization where this application or proceeding is assigned are (703) 308-7724 for regular communications and (703) 308-7724 for After Final communications.

Any inquiry of a general nature or relating to the status of this application or proceeding should be directed to the receptionist whose telephone number is (703) 308-1782.

Angel Roman
Art Unit 2812

John F. Niebling
Supervisory Patent Examiner
Technology Center 2800